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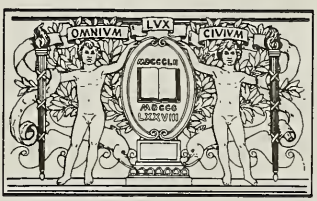

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Transportation Elements
of the
MIDTOWN CULTURAL DISTRICT
Boston, Massachusetts

Prepared for
Boston Redevelopment Authority

By
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Chapter 1

INTRODUCTION

BACKGROUND

The Midtown Cultural District, now being planned by the Boston Redevelopment Authority, will create an area in downtown Boston with a unique identity as a center of performing and visual arts, and retail activity. The limits of the Cultural District are presented in Figure 1. The transportation characteristics of the district will also be distinctive in its level of activity at night and on weekends, which are customarily off-peak travel periods for the rest of downtown. At the same time, plans for the area include a substantial amount of office, retail and residential development that will be active during the daytime, adding to the growing demand being placed on highway and public transportation systems in Boston. The transportation element of the Cultural District Plan is intended to provide an attractive system of access, and to support an active urban pedestrian environment. This report provides an overview of transportation conditions, issues and policies that are relevant to the transportation element of the plan.

SCOPE

The transportation assessment of the Cultural District Plan includes analyses of vehicular traffic impacts, parking, measures to reduce automobile traffic and theater-specific transportation characteristics. The analysis describes existing traffic operations and traffic impacts to the Cultural District expected from a build-out development scenario. The adequacy of existing and future parking supplies is assessed for shared use. The concept of shared parking use is examined by temporal distribution and relative location, and pricing policies are also discussed. Included is an analysis of theater-specific transportation characteristics, such as evening parking needs and charter/school bus parking.

This scope included the analysis of traffic and parking conditions only. Assessments of transit and pedestrian conditions were not undertaken.

TRAFFIC ANALYSIS STUDY PROCESS

The traffic analysis conducted for this project can be divided into three steps, each building on the next. These steps are described below:

1. Description of Existing Conditions - Current conditions in the study area were inventoried, including circulation patterns and geometric conditions. Existing traffic volumes were collected at key intersections, with additional counts provided by the Boston Transportation Department (BTD); the current level of development was provided by the Boston Redevelopment Authority (BRA).

Midtown Cultural District
STUDY AREA

Figure 1

2. Forecast of Design Year Conditions - Future traffic generated by the Cultural District was estimated for a Build development scenario provided by the BRA. A likely trip distribution pattern was based on information included in the 125 Summer Street EIR, modified to reflect specific characteristics of the District.

3. Analysis - Future traffic volumes were assigned to both the No-Build and Build networks. A comparison of traffic demands to the existing roadway capacity was conducted for existing and Future (1998) No-Build and Build conditions.

Chapter 2

EXISTING CONDITIONS

STUDY AREA CIRCULATION

The major east-west streets in the Cultural District are Stuart-Kneeland and Boylston Street which continues into an eastbound only Essex Street. The major northbound street is Charles Street and the major southbound street is Tremont Street. A minor northbound street is Chauncy Street and to a certain extent, Washington Street which cannot be considered a through street because it is interrupted by the auto-free Downtown Crossing. Bedford Street, Chauncy Street, Avenue de Lafayette, one block of Washington Street, West Street and Tremont Street provide a westbound and southbound route on the northern periphery of the Cultural District. Many of the above mentioned streets are one way. The pavement widths of streets in the District vary from narrow alleys to a median divided Stuart/Kneeland with two moving lanes in each direction and parking lanes and left turn slots.

TRAFFIC VOLUMES

Base year (1988) traffic counts were developed from Boston Transportation Department Files, recent EIR's and counts conducted by TAMS for this study. Daily and monthly factors were applied to traffic counts to develop average annual weekday conditions.

Intersections included in the analysis of traffic impacts in the Cultural District include:

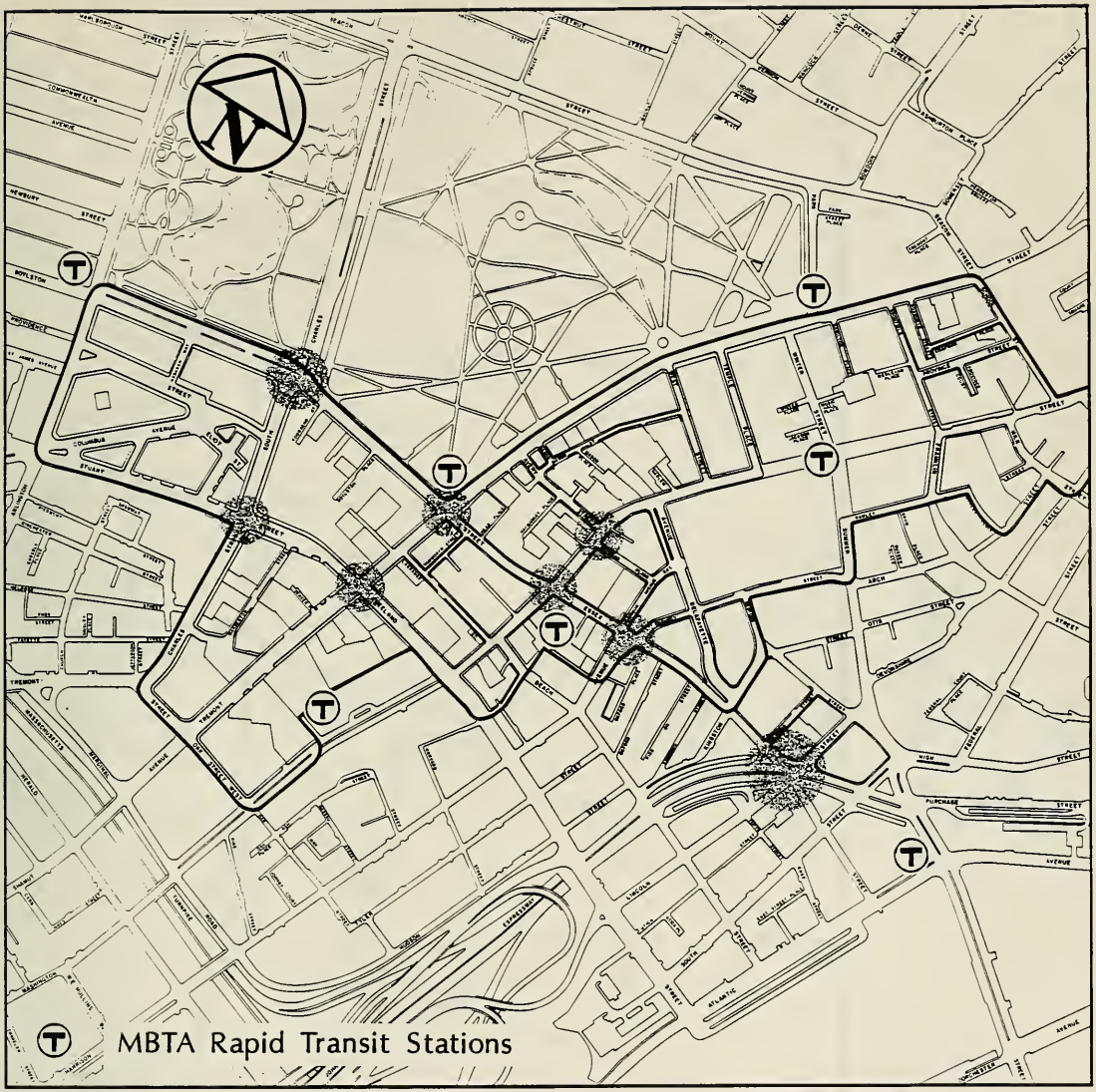
- Boylston Street/Charles Street
- Boylston Street/Tremont Street
- Boylston Street/Washington Street/Essex Street
- Tremont Street/Stuart Street/ Kneeland Street
- Essex Street/Surface Artery
- Washington Street/Hayward Street/Avery St.
- Charles Street/Stuart Street
- Essex Street/Harrison Street

These intersections (See Figure 2) were chosen based on the results of earlier studies, as being reflective of those most likely to be impacted by Cultural District development. The existing PM peak hour turning movement counts are shown in Figure 3.

PARKING

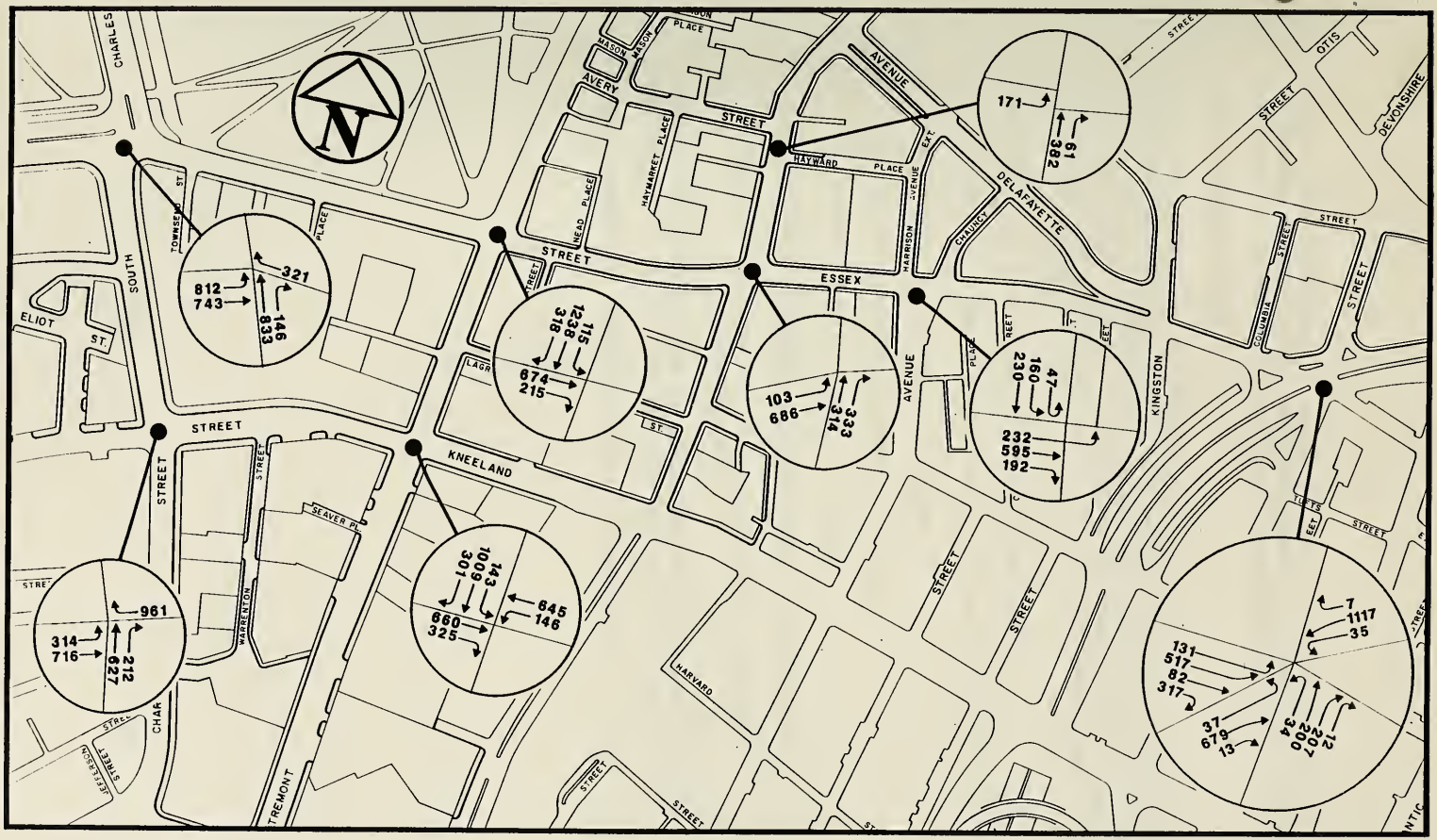
Currently, within the boundaries of the Cultural District a total of 7,651 parking spaces exist, including 7,239 public spaces and 412 private use spaces.

A total of 6,497 public spaces are in twelve garages and 742 spaces are on public lots. Private spaces are located in three garages, with 257 spaces, and one lot with 155 spaces. The daytime demand for these spaces is generated by office, retail, residential, hotel, and institutional uses. The demand is



Midtown Cultural District
KEY INTERSECTIONS

Figure 2



Midtown Cultural District
PM PEAK HOUR TRAFFIC
1988 EXISTING

Figure 3

greater than the supply, as exhibited by full parking garages and lots during the weekday morning hours. Any development in the area will require accompanying increases in parking to accommodate the demand.

PUBLIC TRANSPORTATION

The Cultural District is traversed by three of the four rapid transit lines. The Orange Line stops at Chinatown, Downtown Crossing, and at the New England Medical Center. The Green Line stops at Boylston Street, Park Street and Arlington Street. The Red Line stops at Downtown Crossing and at Park Street. Blue Line riders can transfer to the Green Line at Government Center or to the Orange Line at State Street.

The District is also served by six MBTA bus lines:

Route #3 - Boston Marine Industrial Park to Charlestown

Route #11 - Bay View to Chinatown

Route #43 - Ruggles Station to Downtown

Route #49 - Dudley Square to Downtown

Route #55 - Queensberry to Downtown via Copley Square

Route #352 - Town of Burlington to Boston, extending to Copley Square in the morning only

Commuter rail service from the south and west of Boston terminates at South Station, while service from the north terminates at North Station.

Express buses from Riverside, Waltham and Watertown also go to the District.

Chapter 3

DESIGN YEAR CONDITIONS

DEVELOPMENT SCENARIO (1998)

Within the Cultural District, development is expected to reach a total of 8,181,059 square feet by 1998, representing an increase of 5,589,659 square feet, compared to current (1988) activity levels. The increase will be comprised of 3,456,493 square feet of office space, 702,569 square feet of retail space, 944,241 square feet of new housing, 440,756 square feet of hotel use, and 45,600 square feet of new cultural facility expansion. These proposed increases are summarized by development site in Table 1 and shown on the map in Figure 4. Although not within the Cultural District boundaries, the Kingston-Bedford development is included in the table and has been factored into all the analyses.

PLANNED TRAFFIC IMPROVEMENTS

For purposes of the analysis in this report, the following improvements were assumed:

- Improvements at Phillip's Square (Harrison, Chauncy and Essex) may include traffic installation and geometric improvements associated with urban design proposals, but no circulatory changes were assumed.

- The reversal of Avery Street to one-way westbound, and the proposed "S" alignment of the Lafayette-Hayward-Avery connection, as illustrated in Figure 5, was assumed.

- The widening of Essex Street, between Atlantic Avenue and Kingston Street, and the closure of Lafayette Avenue at Washington Street were assumed.

- Impacts of the proposed Kingston/Bedford project at the edge of the District were included in the analysis.

TRAFFIC VOLUMES

Increases in traffic are normally comprised of two elements: background traffic due to normal areawide population and employment growth, and traffic increases due to specific developments.

- Background Growth -- A background growth factor of one percent per year, developed from data included in the 1972 and 1982 Downtown Boston Cordon Counts, was used to expand existing traffic counts to the Design Year of 1998, representing a Future No-Build network, shown in Figure 6. Also included in the background volumes are estimates of the traffic generated by the proposed Kingston-Bedford development.

TABLE 1

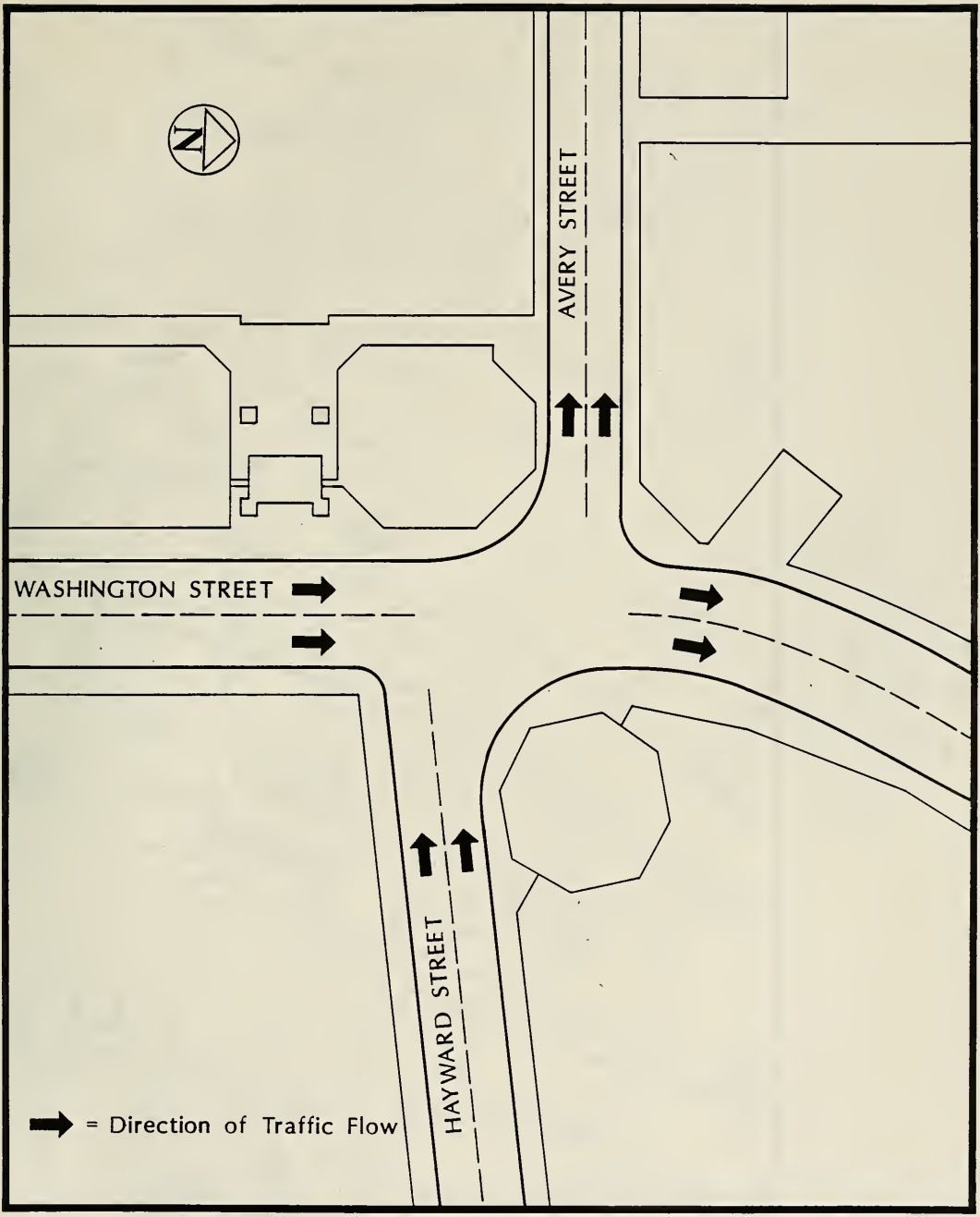
SUMMARY OF NEW DEVELOPMENT

Office Project	Net New Total GSF	Net New Office GSF	Net New Retail GSF	Net New Housing GSF	Net New Hotel GSF	Net New Cultural GSF
Parkside at Mason	31,866	(6,164)	(3,882)	41,912	0	0
Parkside East	105,401	(4,800)	904	109,297	0	0
146 Boylston Street	83,340	6,290	1,350	75,700	0	0
Don Bosco	348,000	0	32,000	316,000	0	0
Park Square	299,987	75,000	28,987	196,000	0	0
45 Province Street	147,691	140,381	7,310	0	0	0
90 Tremont Street	102,790	130,790	5,800	0	0	(33,800)
Commonwealth Center I*	1,052,174	620,000	176,686	(19,668)	215,756	59,400
Woolworth's	400,000	400,000	0	0	0	0
Boston Crossing I**	826,000	500,000	326,000	0	0	0
Boston Crossing II**	750,000	750,000	0	0	0	0
Commonwealth Center II	498,480	477,366	21,114	0	0	0
Potential						
110-120 Tremont Street	80,930	74,630	6,300	0	0	0
Wilbur Theater/P-7	53,000	43,000	10,000	0	0	0
Hinge Block Study Area	460,000	175,000	40,000	225,000	0	20,000
Parcel C-4	350,000	75,000	50,000	0	225,000	0
	5,589,659	3,456,493	702,569	944,241	440,756	45,600
Background Project						
Kingston-Bedford	922,485	902,485	20,000	0	0	0

* Commonwealth Center I Cultural Facility is located on Keith Block.

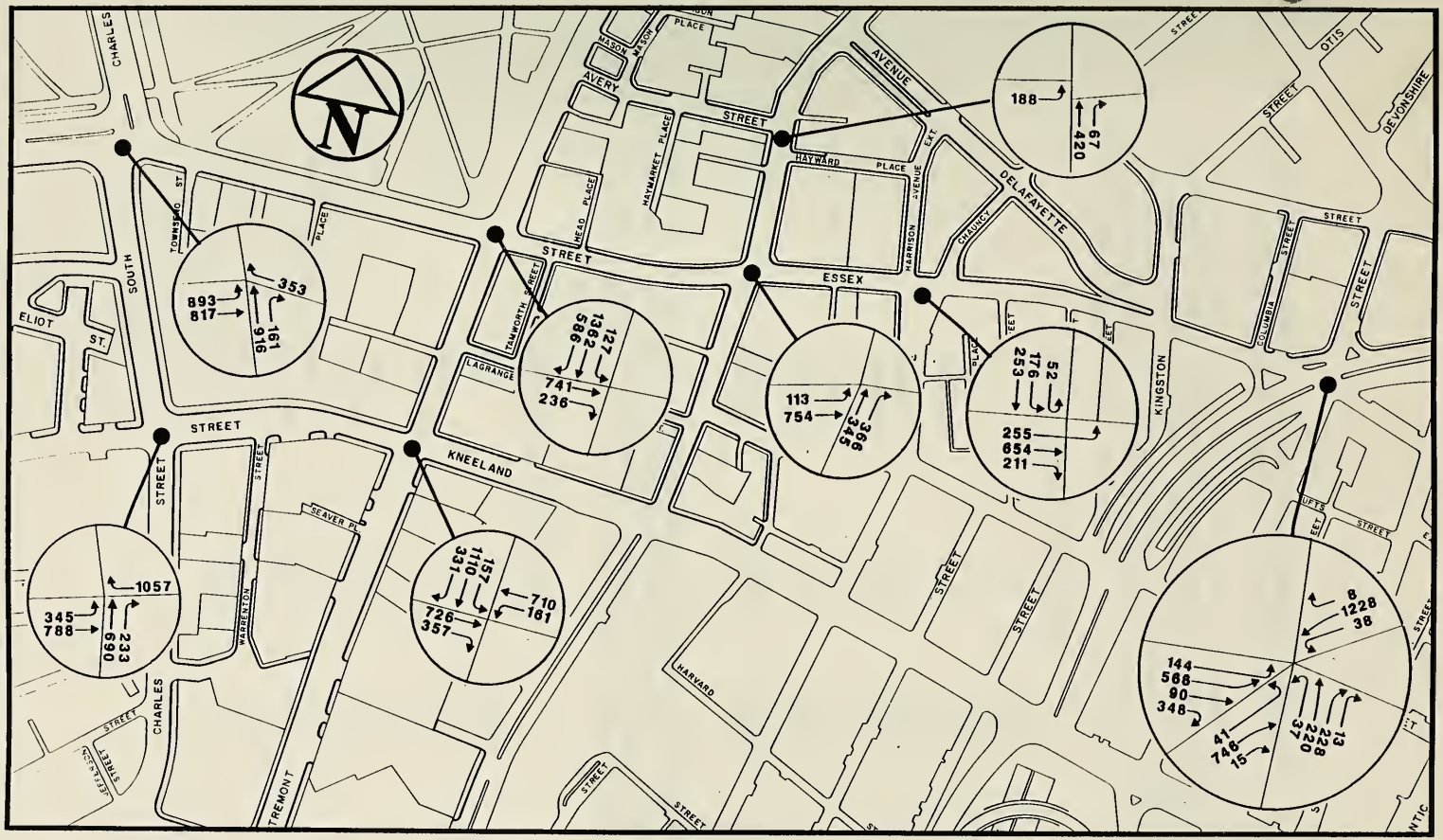
Midtown Cultural District
DEVELOPMENT SITES

Figure 4



Midtown Cultural District
WASHINGTON/HAYWARD/AVERY INTERSECTION
GEOMETRY AND TRAFFIC FLOW PATTERN

Figure 5



Midtown Cultural District
PM PEAK HOUR TRAFFIC
1998 NO-BUILD

Figure 6

- Development Growth -- The build-out scenario (summarized in Table 1) was provided by the Boston Redevelopment Authority (BRA).

- Trip Generation -- Trip Generation rates were based upon recent EIRs produced for similar land use developments in downtown Boston. Office and retail rates were based upon values used for International Place and Copley Place. Hotel rates were based upon the Draft Parcel 7 EIR, which surveyed the Holiday Inn, Cambridge Street, Boston. Residential rates were based upon the Rowes Wharf EIR.

Daily Person Trips/1000 SF

		In	Out
Office	Work	4.40	4.40
	Non-Work	2.35	2.35
Retail	Work	2.75	2.75
	Non-Work	16.40	16.40
Residential	Work	0.12	0.12
	Non-Work	0.03	0.03
Hotel	Work	1.00	1.00
	Non-Work	5.94	5.94

- Peak Hour Percentages -- Office and retail peak hour percentages are based on values used for the International Place EIR. Hotel percentages are based on observations made at the Mariott Long Wharf for the Fan Pier EIR. Residential percentages are based on observed values for other developments.

PM Peak Hour Percentages

		% In	% Out
Office	Work	2.0	55.0
	Non-Work	2.0	10.0
Retail	Work	10.0	20.0
	Non-Work	5.0	10.0
Residential	Work	70.0	10.0
	Non-Work	30.0	90.0
Hotel	Work	2.0	6.0
	Non-Work	12.0	9.0

- Mode Split -- Mode Split percentages for office and retail use were based on 125 Summer Street EIR values. The hotel mode splits observed at the Marriott Long Wharf and Holiday Inn and used for the Fan Pier DEIR were adopted. For residential use, work trip rates were developed by adjusting retail work rates and non-work trip rates were assumed to be the same as retail non-work trip rates.

		Mode		
		Auto	Transit	Walk
Office	Work	30	70	0
	Non-Work	28	57	15
Retail	Work	30	70	0
	Non-Work	28	32	40
Residential	Work	30	40	30
	Non-Work	28	32	40
Hotel	Work	30	70	0
	Non-Work	60	15	25

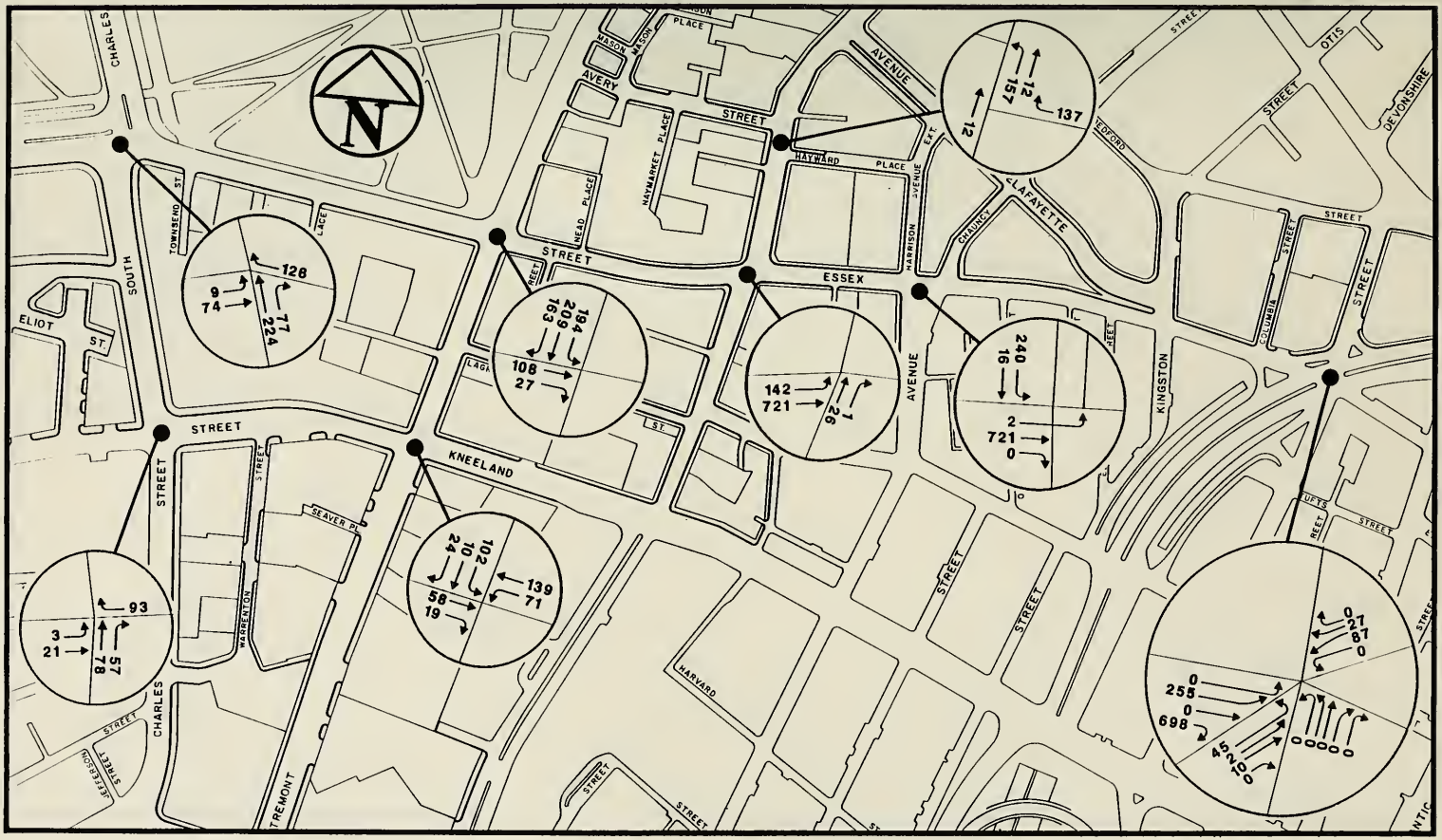
- Vehicle Occupancy Rate -- Office and retail rates are based on values used in the International Place EIR. Residential and hotel rates were assumed to be equal to the retail rates.

Vehicle Occupancy Factors

Office	Work	1.8
	Non-Work	1.8
Retail	Work	1.4
	Non-Work	1.4
Residential	Work	1.4
	Non-Work	1.4
Hotel	Work	1.4
	Non-Work	1.4

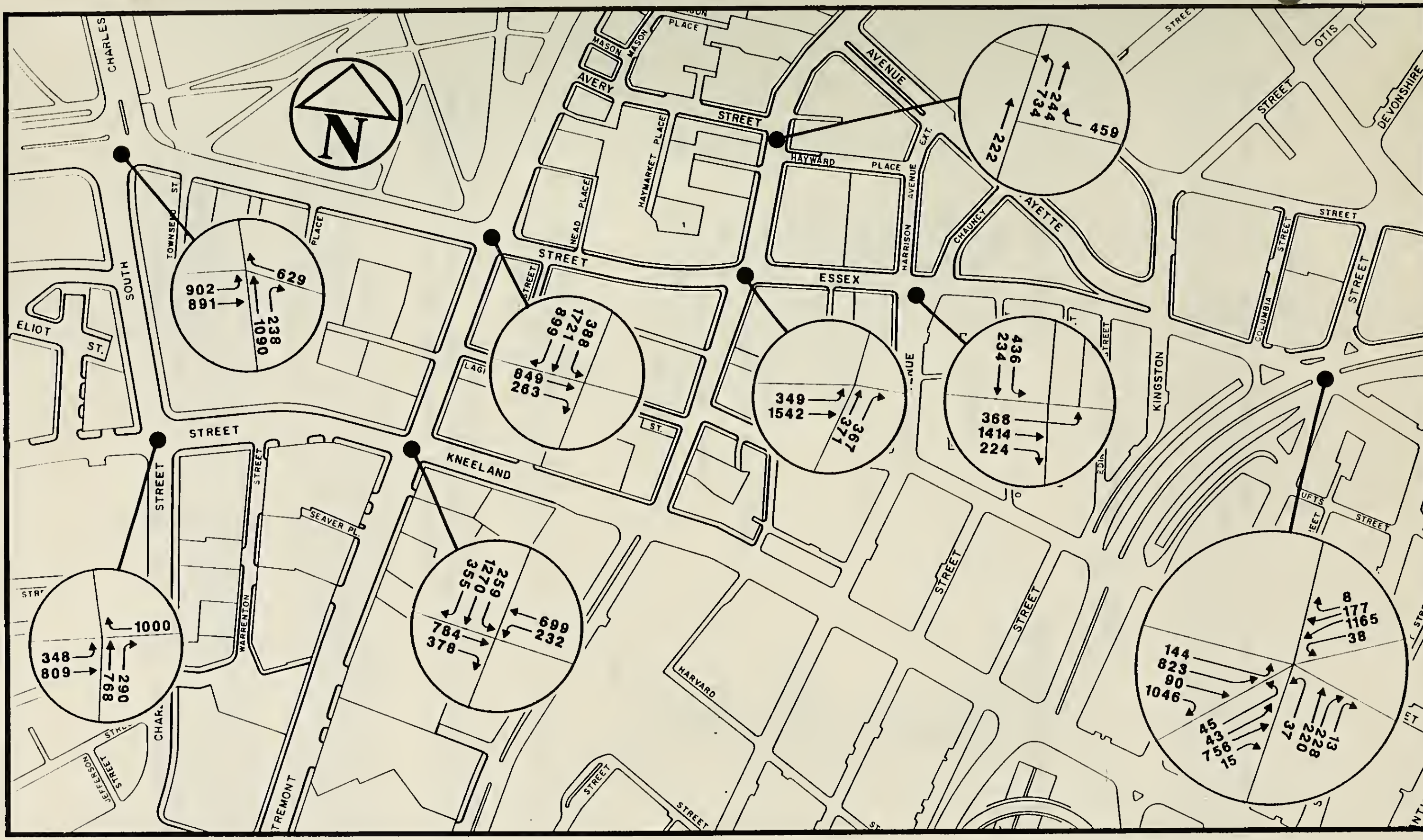
- Trip Distribution -- The trip distribution included in the 125 Summer Street EIR was modified to reflect reasonable trip assignment patterns to/from the Cultural District. The total development scenario was aggregated into eleven parcels, each with slightly different trip assignment assumptions.

- Trip Assignment -- Total assigned trips for the build-out scenario (Figure 7) were then superimposed onto the No-Build Network to develop a 1998 Build Network, shown in Figure 8.



Midtown Cultural District
PM PEAK HOUR TRAFFIC
1998 DEVELOPMENT GENERATED TRIPS

Figure 7



Midtown Cultural District
PM PEAK HOUR TRAFFIC
1998 BUILD
Figure 8

PARKING

The 1998 Cultural District Development scenario includes an expansion of the existing supply of parking by 3,126 spaces. Table 2 lists each new development site and the associated net increase in parking supply assumed.

TABLE 2

NEW PARKING LOCATIONS

Site No.	Development	# of Additional Spaces [1]
1.	Park Square	155-210
2.	146 Boylston Street	69
3.	Parcel C4	81
4.	Don Bosco	166
5.	Parcel C7/Wilbur Theater	68
6.	Hinge Block	161
7.	Commonwealth Center I and II	880
8A.	Parkside at Mason	10
8B.	Parkside East	158
9.	Boston Crossing II	460-760
10.	Boston Crossing I	-- [2]
11.	Kingston/Bedford/Essex Street	144
12.	Woolworth's	50-100
13.	110 - 120 Tremont Street	154
14.	90 Tremont Street	100
15.	45 Province Street	60
		2721 - 3126

1) supplied by BRA
2) parking for Boston Crossing I and II will be located on Site #9, the Hayward Place parcel.

The 1998 increase in parking demand, associated with the development scenario described in Table 1, was estimated based upon parking demand rates for the four general land use categories as follows:

- Office -- A rate of 0.9 parking spaces per 1,000 square feet was used based on information from recent EIR's for typical office projects in downtown Boston. This rate reflects an employee demand of 0.71 and a visitor demand of 0.19. The employee demand is reflective of a 30 percent auto mode share and an average vehicle occupancy of 1.8

- Retail -- A rate of 0.97 parking spaces per 1,000 square feet was used based on national statistics for weekday conditions at major retail developments, modified to reflect utilization of transit and walk modes and auto occupancies typical in downtown Boston. This rate reflects a shopper demand rate of 0.61 spaces and an employee demand rate of 0.36

spaces. The shopper rate assumes a 27 percent auto mode share (33 percent of weekday shoppers arrive by transit and 40 percent walk), and an average vehicle occupancy of 1.8.

- Hotel -- A weekday daytime rate of 0.28 spaces per room was used, based on local and national statistics for downtown hotels and assuming joint use of other parking when hotel demand peaks in the evening and on weekends.

- Residential -- A demand rate of 1 space per dwelling unit was used, assuming that all new housing will require this set aside during the day, whether it is occupied or not.

Based on the above rates an increase in parking demand of 5,739 spaces is estimated to occur under the full build development scenario by the year 1998. This compares to the proposed supply increase of 3,126 spaces. Potential impacts of this imbalance are discussed in the following chapter.

Chapter 4

TRAFFIC AND PARKING EVALUATION

TRAFFIC

Criteria

Analysis was performed for the existing year of 1988, and the design year of 1998. Analysis of traffic capacity and operations was conducted using methodologies described in the 1985 Highway Capacity Manual, Special Report 209.

Signalized Intersections

Level of service for signalized intersections is defined in terms of the average stopped delay per vehicle. The criteria are summarized in Table 2.

TABLE 2

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS)	Stopped Delay Per Vehicle (SEC)
A	≤ 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	> 60.0

Unsignalized Intersections

In capacity calculations for an unsignalized intersection or driveway, the assumption is made that the major street traffic is not affected by the minor street movements. The capacity of the intersection is a function of: the right turns into the major road; the left turns from the major road; through traffic crossing the major road and left turns into the major road; and the number of acceptable gaps in the through traffic streams which allow turning or crossing vehicles to pass through the intersection. The critical acceptable gap is defined as "that gap for which an equal number of drivers will accept a shorter gap as will reject a longer gap." Based on a gap acceptance function, the capacity of the minor approach can be determined.

The difference between available capacity and existing demand is defined as reserve capacity and is used as the criteria for determining level of service. Table 3 summarizes the relationship between the level of service, reserve capacity and expected traffic delay.

TABLE 3

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Reserve Capacity (PCPH)	Level of Service	Expected Delay to Minor Street Traffic
> 400	A	Little or no delay
300 - 399	B	Short traffic delays
200 - 299	C	Average traffic delays
100 - 199	D	Long traffic delays
0 - 99	E	Very long traffic delays
*	F	*

* When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvements to the intersection.

Analysis

Under existing No Build Conditions, only the unsignalized intersection of Harrison/Essex operates below acceptable standards, at level of service "F". Under Build Conditions, the Boylston Street intersection with Tremont Street also operates at level of service "F".

More efficient traffic flow at each of these locations can be achieved, however, with intersection improvements or modifications. At Harrison/Essex, traffic signal installation will improve level of service to "D", with an average vehicle delay of 26.6 seconds. At Boylston/Tremont, an increased level of service "C" (19.6 second average vehicle delay) can be achieved if parking on the south side of the Boylston Street approach is eliminated and restriped to include three ten foot wide lanes, instead of the two that currently exist.

TABLE 4

PM PEAK INTERSECTION

LEVEL OF SERVICE SUMMARY

Signalized

Intersection	Existing (1) Delay	LOS	1998 No Build (2) Delay	LOS	1998 Build Delay	LOS
Tremont/Stuart	11.8	B	15.3	B/C	27.7	D
Boylston/Charles	14.2	B/C	10.2	B	11.5	B
Boylston/Tremont	17.9	C	28.9	D	88.1	F
Boylston/Essex/ Washington	8.8	B	9.3	B	24.9	C/D
Essex/Surface Art.	28.6	D	19.6	C	28.8	D
Charles/Stuart	23.9	C/D	20.0	C	28.7	D
Washington/Avery/ Hayward	10.7	B	7.6	B	10.1	B

(1) using existing signal timing
(2) using optimized signal timing

Unsignalized

Intersection	Reserve Capacity	LOS	Reserve Capacity	LOS	Reserve Capacity	LOS
Harrison/Essex						
eastbound left	745	A	719	A	597	A
southbound through/right	- 132*	F	- 221*	F	- 624*	F

* Although a negative reserve capacity in itself is not meaningful, it does provide a relative measure of capacity deficiency.

In the comparison of the Existing with No Build and Build intersection results, it should be noted that signal timing was optimized for the No Build and Build analysis, while actual timings as noted in the field were used for Existing conditions. This would account for the reduction in delay experienced at some intersections from Existing to Build conditions.

VEHICLE INTRUSION INTO NEIGHBORHOODS

An important consideration in the traffic evaluation process is that of impacts to the local neighborhood streets network. Although the Cultural District is located in downtown Boston, it is bordered by two residential/retail neighborhoods - Chinatown and Bay Village. These communities could potentially be affected by increases in traffic, in terms of congestion, noise and general activity levels associated with more trip generation.

Currently, Stuart/Kneeland Streets and Boylston/Essex Streets provide east/west movements through the Cultural District. Tremont Street and Washington Street provide for north/south movements in the area. One study area intersection, Harrison at Essex Street, is currently operating at a level of service "F". Traffic using this intersection in the PM peak hour is experiencing major delays, causing intersection congestion and possible pedestrian conflicts. Important to residents of Chinatown and Bay Village is the ability of the neighborhood to improve its viability as a retail/residential community. Traffic congestion, causing noise and general confusion, creates a non-desireable atmosphere.

The current street network propagates the use of major arterials to traverse the Cultural District. These major arterials, by providing the best route through the Cultural District, will carry most of the anticipated volume increases. The local street network in the Chinatown and Bay Village areas serve primarily as feeders to the more major distributors and will not experience great increases in the volume of through traffic.

The extension of Essex Street, as proposed by the Boston Transportation Department, would cause some diversion of traffic from Stuart/Kneeland Street to Essex Street intersections.

The new Essex Street project would thus have a tendency to pull traffic distributing itself into or out of the district away from southern Chinatown and the Bay Village area to the less residential corridor of Essex Street. Through traffic, however, would not be encouraged to use the new Essex Street corridor.

Its purpose would be to effectively help in the distribution of traffic generated adjacent to the Essex Street corridor.

REDUCTION OF AUTOMOBILE TRAFFIC-REVIEW OF TRANSPORTATION SYSTEMS MANAGEMENT (TSM)

The traffic analysis has identified certain difficulties on the roadway network which will be compounded and extended by the impact of future development within the Cultural District. To some extent, these can be partially relieved by improvement schemes, such as the Essex Street Extension, and improvements at individual intersections. Additionally, the proper location of parking facilities, control of on-street loading and parking and

the development of a clear and consistent circulation pattern may also assist in relieving congestion.

It is clear, however, that improvement of the roadway network to overcome such problems will result in the network itself becoming more attractive to visitors to the Cultural District and surrounding areas. Accordingly, an essential complement to traffic and highway enhancement is the improvement of the public transportation system, which might thereby attract users to make full use of transit facilities rather than traveling by automobile. In addition, it is desirable to promote higher occupancy of private vehicles, which would also serve to reduce potential traffic volumes.

TSM must be pursued vigorously if it is to have significant impact, and the following measures have been reviewed as a package of management rather than alternative strategies.

Promotion of Public Transportation

The District is well served by transit facilities, with three subway lines and good connections to commuter rail and bus stations. There are, however, significant operational difficulties and inefficiencies in the services, and the following measures are considered appropriate to enhance the system, with a view to improving its attractiveness and thereby increasing ridership.

a) Frequency of Services

Current headways are often not met as a result of operational difficulties and ongoing maintenance problems. An increase in the frequency of services would mitigate some of the excessive headway delays, resulting in reduced waiting time for passengers and increased efficiency of service. Improvements to accommodate theater goers and residents in the evening periods and at weekends would be particularly desireable, along with extended commuter rail services to encourage evening and weekend use.

While commuter rail and MBTA bus services require general improvement, there is a particular need for additional rolling-stock on the Green Line in order to overcome existing operational difficulties and to avoid peak period pressure.

b) User Subsidies

It is difficult to develop any form of fare subsidy which would specifically benefit the Cultural District in isolation from the entire network, and the financial implications of any subsidy scheme are therefore significant. It is apparent, however, that any overall reduction in fares as a result of user subsidy would encourage increased usage. Moreover, indirect subsidy might be introduced by way of low cost parking facilities at commuter rail terminals, or the further promotion of reduced cost season tickets for regular travel, particularly for employees by way of salary sacrifice. The latter

should be exploited as far as possible, bearing in mind the significant decrease in transit use by office workers over recent years.

One further means of subsidy which applies to the Cultural District in particular is the possibility of reduced or subsidised entrance costs for theater patrons using public transportation. This would involve close cooperation with the operators of theaters and other facilities in the District.

c) Pedestrian Facilities

Pedestrian links to transit stations might be significantly enhanced by clear signing and the identification of pedestrain routes. A network of station signing/pedestrain routes to facilities throughout the District could be implemented at relatively low cost.

d) General Improvements

Extensions to the Red and Orange Line platforms are already underway to accommodate 6-car trains, and improved commuter line facilities at South Station form part of plans to make it a major transportation center, including an express bus link to Logan Airport. Although perhaps a longer term proposal, the possible linking of the Blue Line to the Red Line near Charles Station would improve accessibility of the district, mainly owing to the creation of a stronger link with Logan Airport.

A further pending improvement is the rehabilitation of Boylston Street station, with the linking of inbound and outbound platforms and the enhancement of pedestrian connections to Tremont Street. All such capital expenditure schemes require long term planning, but result in significant enhancement of the network.

Promotion of High Vehicle Occupancy

The most obvious means of achieving high vehicle occupancy is the promotion of ride-sharing. Other than general publicity, there are two possible measures to encourage the practice.

a) Parking Rate Adjustment

Experience in other cities has shown that significant increases in car occupancy can be achieved by the introduction of differential parking charges, with reduced charges for cars with one, two or three passengers. This could have a particular effect upon travel to work by office workers, again relieving the trend of public to private travel which has taken place.

Although such a scheme could be based upon "declared" ride-sharing, it is open to abuse if vehicles can obtain reduced parking rates merely upon production of certain documentation. The most effective system should involve the entry or exit of the vehicle along with its passengers to obtain appropriate reduction in parking charges.

b) Preferential Parking

Again, such a measure would involve the allocation of a parking space to vehicles with one or more passengers, in preference to those with a driver only. This particular measure would be more appropriate in the situation where specific parking lots are associated with specific developments or facilities, and therefore depends upon cooperation with the operators.

One further form of ride-sharing is by charter (or school) bus, which is particularly applicable to the theater facilities in the District. Specific attention to setting-down/picking up facilities and bus parking locations could influence the extent of large party visitations.

Transportation Management Association (TMA)

As indicated previously, no one measure on its own is likely to achieve significant impact in reducing vehicle traffic. Some coordinated package of measures is therefore required to bring about even small changes in what are well established travel characteristics in the District. Above all, improvement in transit information and a campaign of public awareness are essential for the success of such policies. The coordination of these measures can be achieved by forming a TMA to manage the supply of parking, and to monitor the operation of transportation facilities. The TMA can be comprised of major employers and property owners within the District, in association with City and State agencies.

PARKING

As discussed in Chapter 3, the full development scenario for the Cultural District is estimated to result in an increased demand for 5,739 spaces compared to the proposed supply increase of 3,126 spaces. Given that existing parking in the area is utilized at or near capacity on a typical weekday, the areawide total parking deficit is likely to increase by approximately 2,600 spaces.

Parking Impacts

Likely impacts of the identified imbalance in parking supply and demand include the following:

- By 1998 additional parking is likely to be developed in a number of areas adjacent to the Midtown Cultural District. These include the new garage under construction at Post Office Square, the proposed new Kingston-Bedford garage and possible new parking facilities located at South Station, North Station, Government Center, Park Square and the Back Bay. Some weekday parking demand from the area is likely to accommodated in these new facilities.

- The growing demand for parking as the area develops will result in an increase in parking price which will divert auto commuters to other

modes, principally transit and ride sharing. For example, if the rate of auto use by all travelers to the area were to drop by 19 percent by 1998, parking supply and demand conditions would stay as they are today in the area. For work trips this would require an increase in the transit mode share from 70 percent to 76 percent. In a similar fashion, increasing ridesharing would also reduce demand. The increased parking deficit could be eliminated if the average vehicle occupancy were to increase by 19 percent for all trips. For work trips this would require an increase from 1.8 persons per vehicle to 2.14 persons per vehicle.

- The increased parking demand is also likely to put greater pressure on the lower priced parking in areas adjacent to the downtown core such as the Fort Point Channel, South Station, North Station, Government Center, Park Square, Back Bay, Chinatown and the New England Medical Center area.

- Midday parking availability for shoppers is likely to be limited as area commuters will utilize much of the new parking, unless parking policies are adopted to discourage long-term parking or establish midday setasides.

Parking Mitigation

In addition to the construction of new parking facilities either in or adjacent to the Midtown Cultural District, potential actions to mitigate parking impacts include the following:

Pricing Policies

Appropriate price scales can be effective in ensuring that the intended parking use of a facility be realized. Long term parking can be structured as a flat fee, or as a variable rate that imposes high hourly fees initially that are quickly reduced as the duration grows. Short-term parking can be encouraged through rate ceilings applied to the first hour of parking, possibly extended through the second and third hours, after which a higher hourly fee is charged.

It may also be desireable to offer some free parking in retail areas as an incentive to shoppers. For example, at the Lafayette Garage, short-term parking is free on Saturday, validated by merchants at Lafayette Place.

Resident, overnight parking can be an additional revenue source when operators are willing to consider shared parking. A reasonable fee can make this an attractive alternative for area residents that would otherwise park on the street, or in relatively distant facilities.

Each of these strategies require two key considerations. First, is there a market for those uses, and when? For example, free validated parking at Lafayette Place is reasonable on weekends, but not during the week when higher priced all-day commuter use will bring in greater revenue. The relative demand for each use is also a factor in determining the utility of keeping facilities in operation during off-peak or shared periods.

Overnight resident parking may only be possible when costed at a lower rate than for peak period. However, operating costs may be equal or higher than peak period.

As a strategy to reduce peak-period traffic congestion, short-term parking is favored over long-term parking. Long-term parkers are typically commuters and tend to travel during peak periods when highway capacity is constrained and public transportation frequencies are highest. Short-term parkers, on the other hand, tend to travel downtown for shopping or business purposes during periods which avoid peak-period traffic conditions. Thus, a pricing policy which favors short-term parking, either by reserving a certain number of spaces for use after the morning peak or by setting lower short-term rates, would both encourage commuter use of public transportation during peak-periods as well as encourage retail sales by reducing the cost and increasing the availability of parking for shoppers.

Shared Use

The concept of shared parking facilities is effective when land uses with different demand distributions are located within similar geographic bounds. This will be characteristic of the Cultural District that will be comprised of office, retail, residential and entertainment developments.

Parking accumulation distribution is summarized for various land use categories in Table 1 below.

TABLE 1

SUMMARY OF PEAK PERIOD/PARKING ACCUMULATION
BY LAND USE CATEGORY

Land Use	Peak Accumulation
Office	8 AM - 4 PM
Retail	11 AM - 8 PM
Restaurant	6 PM - 10 PM
Cinema (Theater)	8 PM - 11 PM
Residential	4 PM - 7 AM

Source: "Shared Parking," Urban Land Institute/Barton-Aschman Associates, Inc.

From these distributions it is clear that there is potential for shared parking between many of the land uses. Office use peaks between 8:00 AM and 4:00 PM, which impiles that many spaces could be made available for restaurant, theater or residential use during off-peak hours without limiting the capacity for office use.

Give the location of parking facilities and theaters and restaurants in the Cultural District, shared parking is feasible (and largely in place) in the

vicinity of Park Square at sites including the Transportation Building and the Park Square Garage, on Tremont Street along the Boston Common, and at Lafayette Place. Although the New England Medical Center Garage is located in close proximity to existing theaters, utilization of the garage for hospital parking which generally exhibits more uniform demand throughout the day, may preclude use for theater and restaurant activities in the evening.

Future development of theaters and restaurants in the Cultural District will encourage the expansion of shared use parking throughout the area. As the intensity of activity in the area increases, evening patronage at parking facilities will also increase, thereby making extended parking hours financially more desireable for the operators. As the level of activity increases, security will also improve due to a greater density of people in the vicinity of the parking facilities.

A final consideration to the implementation of a shared use policy is the Boston Parking Freeze. The "letter of the law" limits the amount of public parking that may be provided downtown. The intent of the law, however, is to limit traffic congestion and air pollution during the morning and evening peak commuter hours. The difference is significant since, while there are physically enough parking spaces within the boundaries of the Midtown Cultrual District to accommodate peak evening and weekend demand, many of the spaces are restricted to work trips only by the Parking Freeze. As such, there will be a parking shortfall. The interpretation of the Parking Freeze is an issue that should be investigated by the City to clarify the actual parking capacity for evening and weekend use.

Each of these parking mitigation measures are strategies that can be monitored and optimized through formation of a Transportation Management Association (TMA), as discussed earlier in this chapter.

Chapter 5

THEATER-SPECIFIC TRANSPORTATION ISSUES

Theater related trips, which mostly occur during the off-peak hours (evenings and weekends) should not strain the roadway capacity, parking garage operation or the transit system. However, concerns related to the characteristics of these trips need to be addressed in context with the overall Cultural District Plan.

Specifically, for the theaters in the Cultural District a comprehensive transportation plan should include strategies to efficiently direct an infrequent visitor, encourage the use of public transportation, and provide clear and detailed information on the options of combining attendance of a performance with other District activities, such as dining before the show or visiting a club after the show to avoid peak traffic congestion.

Information on theaters in the District was obtained from two sources: 1) a report, "The Contribution of Boston Theater District Audiences to Boston's Economy", Boston Redevelopment Authority, March 1981; and 2) meetings with the Transportation and Parking Subcommittee of the Midtown/Cultural District Task Force.

PARKING DEMAND

Currently, (1988) the Theater District has 11,000 seats. The 1998 Build Development Scenario proposes an additional 3,000 seats. With popular, concurrent shows at the larger theaters a reasonable maximum attendance figure is about 91% of the District's 14,000 seats. This would occur on a weekend night when most of the theater houses are lit or during special holiday performances.

Using the following assumptions from representative theater directors within the District, the peak night demand for parking by theater patrons is calculated to be 4,460 spaces.

Private Auto	- 84%	- Average Vehicle Occupancy = 2.4
Taxi	- 8%	- Average Vehicle Occupancy = 2.4
Charter Bus	- 4%	- Capacity = 40
Transit	- 3%	
Walk	- 1%	
	100%	

Average weekday attendance figures are normally about 60% of seating capacity, depending upon the caliber of the show.

PARKING SUPPLY

The supply of parking within reasonable walking distance to the heart of the Theater District is listed below. While all of these parking areas are potential locations for a theater patron to park, factors other than distance will influence a patron's preference for parking. Most patrons will prefer to park at locations which are easily found and have safe walkways to and from the theater.

The 1998 anticipated public parking capacity is presented below in three categories, based on proximity to the location of the theaters.

Very Close proximity:

Location	Spaces
Motor Mart	900
Park Plaza	900
Transportation Building	275
Tufts NEMC	937
Tremont on Common	350
Four Seasons	220
	3,582

Within reasonable walking distance:

Location	Spaces
Shopper's Garage	500
Boston Common	1,500
Lafayette Place	1,267
Kingston/Bedford	735
	4,002

Outlying Locations:

Location	Spaces
Leather District	350
Province St. Garage	290
Woolworth Garage	900
Hancock Garage	774
South Station	unknown
	1,540

Assuming the outlying locations will only be desirable with new incentive programs, the public parking capacity is 7,584 spaces. Therefore, theater specific parking demand represents 60% of the theoretical capacity. The remaining 40% would probably not meet the demand of theater employees, night club patrons, residual daytime parkers, and nighttime residential parkers. The number of residential parkers who use each of garages at night is an unknown quantity and further investigation into this issue may be warranted. However, an inquiry at the Boston Common Garage revealed that the average number of overnight residential parkers is about 400 vehicles.

A combination of additional parking locations and incentives need to be created to provide adequate evening parking and promote alternative modes of transport. A design night, which will have a maximum amount of theater activity, will require additional parking or a method to effectively use the existing outlying parking areas.

For weeknight performances, which on average draw 60% of the seating capacity, the parking supply would appear to be adequate. The parking demand would be for 2,940 spaces. The total theoretical supply, as before, is 7,584. The remaining supply is probably adequate for other uses.

Finally, additional private non-residential spaces will be constructed under the 1998 Development Scenario, on parcels adjacent to the concentration of theaters. These will be located at the Hinge Block (93 spaces), Commonwealth Center (800 spaces), and Parcel C4 (175 additional spaces). If, through policy changes and developer cooperation, these private spaces could be accessed in the evening by theater patrons, the theater design night demand would decrease to 52% of the total theoretical parking supply.

STRATEGIES FOR CHANGING TRANSPORTATION HABITS

Parking

The outlying parking areas have the potential to relieve the demand on the closer parking areas if proper incentives are developed to attract theater patrons and easily transport them into the theater district. The use of shuttle buses from parking locations such as South Station, the Hancock Tower, Woolworth Garage, the Province Street Garage, would also increase the usable parking supply for the theater district. The tourist trolleys used during the day could be used as a festive alternative for the evening shuttle buses from parking locations, hotels, and perhaps some MBTA stations. However, any shuttle operation would need to be reliable, frequent and fast to ensure use by patrons destined to the theater district. It would have to be perceived as a worthwhile alternative to parking closer and walking.

Since many theater patrons cannot be convinced of the advantages of not driving into the area, steps must be taken to inform drivers of their parking alternatives. Since a majority (between 60% and 80%, depending on popularity of show) of sales are done by phone, a system could be set up to provide explicit directions for the patron. Information included with the tickets could include a map of the area, a routing plan (similar to automobile rental

agencies), and a specific recommendations for routing to parking locations. A program which provides discounts to the theater patron who uses a specific garage would allow some direct influence by the theater operators over the distribution of their patrons.

A more ambitious approach would be to actually sell a parking voucher to a theater patron at the time the performance tickets are reserved over the phone. A patron would be asked if he would be driving to the show. If so, he would be given the option of paying for his parking ticket at a specific garage location. He could charge it and a voucher would be sent with the tickets.

This requires cooperation by the garage owners to hold these pre-reserved parking spaces and honor the voucher. Perhaps a location in the garage close to the exit could be reserved for these people. That would be an added incentive from the patron's point of view. The garage owner would be guaranteed a certain income for that evening by knowing beforehand how many to reserve. However, this may not be an advantage if the garage is already used to capacity.

This pre-reserved system may also work as a method to direct patrons from the closest garages to the ones which are a little longer walk. Again, garage operators who are located further away may be in favor of this. A theater-subsidized discount program would be an added incentive for patrons to order their parking voucher over the phone.

Transit

Another way to decrease the demand for parking by theater patrons is to provide incentives for them to use alternate modes of transportation. By parking at MBTA transit stations and riding the T into the city, patrons would avoid the challenge of locating a parking space in the theater district. The promotion of transit use requires two steps. First, the existing transit system must be publicized to theater patrons who are unfamiliar with the system and may have misconceptions. Secondly, new methods of attracting these theater patrons as riders need to be developed with the input and cooperation of MBTA officials.

A map of the existing transit system should be made available to all theater patrons. Designed specifically to promote access to the Cultural District and the individual theaters and clubs, the map could be distributed at the theaters and could be enclosed with reserved tickets sent by mail. The Boylston Street MBTA Station (Green Line) needs to be renovated to provide a clean, safe atmosphere in which to use the existing transit lines. The New England Medical Center Station (Orange Line) is part of the relocated Southwest Corridor and provides direct access to Tremont and Washington Streets. Currently, renovations are being done in the Chinatown Station (Orange Line), located at Washington and Essex Streets. These two Orange Line stations should be promoted as excellent ways to access the Theater District.

Enforcement

Traffic flow in the area is hindered by illegally parked and double parked vehicles. The City of Boston has undertaken a Traffic Relief Program (TRP) on such major streets as Congress Street, Arlington Street, Cambridge Street and Tremont Street.

The program exercises strict enforcement of parking regulations to reduce traffic delays. Boylston Street often has double parked vehicles, many of which are trucks making local deliveries. For example, deliveries to the Little Building, on the corner of Tremont and Boylston Streets, are apparently done from Boylston Street, since the loading area in the rear of the building is used for parking. Boylston/Essex Street and Stuart/Kneeland Street have been identified by the City as candidates for the TRP improvement study. The status of this next TRP phase is unclear, but should be actively pursued by the City to improve traffic flow throughout the Cultural District.

Promotional

A possible parking incentive program at MBTA Park and Ride locations could be developed to encourage ridership. A "frequent flyer" type arrangement might be used to reward frequent parkers at particular MBTA or other outlying parking areas. The logistics of this would need to be developed. Other incentive programs which reward patrons who park outside the city and take an alternate means of transportation into the city should be investigated. Rewards may include a free drink at intermission, or a discount at a nearby restaurant or club. The latter incentive would also work to disperse the peak traffic congestion immediately before and after a show by encouraging before and after show activities.

A logo which represents the Cultural District, and in particular, the theater aspect of the District, should be developed. This logo could then be used throughout the Theater District as a guide to parking areas, pedestrian walkways and particular theaters. The logo could be used directly on street sign names to guide unfamiliar visitors. The program undertaken in the Longwood Medical Area to guide visitors with large, distinctive directional signs could be used as a model. The recognition of a logo by patrons and through media will work to create the sense of a cohesive, entertainment district. Ideally, this logo would be used on advertisements, tickets, promotional material and all correspondence from those members of the Theater District wishing to promote a unified district.

The provision of safe and well-lit pedestrian walkways is essential to the overall success and perception of the Theater District. This would include clear routings between parking locations, transit stations, theaters, restaurants and clubs. This will help create the atmosphere of theater boulevards and theater alleys which are important to the success of the Theater District concept.